

REMARKS

Note regarding claim amendments

Applicant has amended the independent claims to place them in better condition for potential appeal. Applicant requests that the Examiner enter these amendments, because no further search is required on the part of the Examiner. The independent claims were previously limited to (a), (b), or (c) being performed, and are now effectively limited to just (b) or (c) being performed. However, the Examiner already explained in the final office action how she believes that the prior art in combination appears to suggest (b), and how she believes that the prior art in combination appears to suggest (c). Therefore, the Examiner has already searched for and considered just (b) or (c) being performed – as such, amending the independent claims so that just (b) or (c) is proper even after final office action.

Claim rejections under 35 USC 103

Claims 1, 11, and 31 are independent claims, from which the remaining pending claims ultimately depend. Claims 1, 6, 11, 12, 16, 21-22, and 29 have been rejected under 35 USC 103(a) as being unpatentable over Ulrich (5,753,417) in view of Tashiro (2004/0257506). Claims 3-5, 23-28, and 30 have been rejected under 35 USC 103(a) as being unpatentable over Ulrich in view of Tashiro, and further in view of Cauchi (2004/0101790). Claims 13-15 have been rejected under 35 USC 103(a) as being unpatentable over Ulrich in view of Tashiro, and further in view of Okoroanyanwu (6,589,713). Claims 31-36, 41-48, and 52 have been rejected under 35 USC 103(a) as being unpatentable over Ulrich in view of Tashiro, Okoroanyanwu, and/or Cauchi, and further in view of Makigaki (6,863,375). Claims 7-10, 17-20, 37-40, and 49-51 have been rejected under 35 USC 103(a) as being unpatentable over Ulrich, Tashiro, Okoroanyanwu, and/or Cauchi.

Applicant respectfully submits that at least as amended, claims 1, 11, and 31 are patentable over Ulrich in view of Tashiro, and optionally in further view of any other of the cited prior art references. As such, the remaining pending claims are patentable at least because they each depend from a patentable base independent claim. Applicant discusses claim 1 herein as representative of all the independent claims 1, 11, and 31 insofar as the present rejection is concerned.

Furthermore, claim 1 is limited such that the method is performed “such that *one of*” (a) and (b) is performed (please note that (a) used to be (b) and (b) used to be (c), but Applicant has “re-lettered” (b) and (c) to be (a) and (b) so that (b) is not the first letter). First, (a) recites that the second portion is exposed before the first portion is exposed, and baking the layer is achieved by performing a *single* post-exposure baking operation after the first and the second portions of the layer have been exposed. Second, (b) recites that the second portion is exposed at least substantially at the same time at which the first portion is exposed, and baking the layer is achieved by performing a *single* post-exposure baking operation after the first and the second portions of the layer have been exposed.

Therefore, in either case, you perform a *single* post-exposure baking operation to perform the method to result in the depression being formed. In the previous office action response, Applicant explained how, by comparison, Ulrich in view of Tashiro suggests that *two* post-exposure baking operations are performed, such that Ulrich in view of Tashiro does not suggest the claimed invention. In response, the Examiner has argued that the two post-exposure baking operations of Ulrich in view of Tashiro is equivalent to the single post-exposure baking operation of the claimed invention, such that Ulrich in view of Tashiro renders the claimed invention *prima facie* obvious and unpatentable. Applicant respectfully disagrees.

Applicant performed a brief prior art search after receiving the final office action, and has submitted two newly discovered references in the information disclosure statement filed herewith. Applicant submits that these references show that one of ordinary skill within the art would not

believe that the two post-exposure baking operations of Ulrich in view of Tashiro is equivalent to the single post-exposure baking operation of the claimed invention. First, note that the Petersen reference, in the abstract provided, indicates why two post-exposure baking operations specifically provide for a given effect. Likewise, second, note that the Fuji Film reference, on page 6 under “Softbake”, indicates why two baking operations (albeit not post-exposure bakes) specifically provide for a given effect. As such, this means that two post-exposure baking operations are not equivalent to a single post-exposure baking operation as in the invention – that is, two post-exposure baking operations are not *equivalent* to a single post-exposure baking operation, but rather two post-exposure baking operations provide a *different effect* than a single post-exposure baking operation does.

Therefore, both Petersen and Fuji Film stand for the proposition that as a general matter, two post-exposure baking operations are not equivalent to a single post-exposure baking operation as in the claimed invention. The next issue, then, is whether Ulrich in view of Tashiro suggests that, nevertheless, two post-exposure baking operations are equivalent to a single post-exposure baking operation *in the specific case of forming a depression*. At best, however, it is unclear that Ulrich in view of Tashiro overcomes the general proposition of Petersen and Fuji Film that two post-exposure baking operations are equivalent to a single post-exposure baking operation. This is because the only mention in the 12 pages of Ulrich and in the 60 pages of Tashiro as to post-exposure baking to perform a depression is in a single paragraph, paragraph [0206] of Tashiro, which states that “after prebake, ultraviolet irradiation, first bake, and second bake are sequentially performed to form projections and depressions.” Ulrich in view of Tashiro simply just does not suggest that two baking operations are equivalent to a single baking operation, in the specific case of forming a depression.

Therefore, we are left with the following. First, we have the proposition that as a general matter, one of ordinary skill within the art does not view two post-exposure baking operations being equivalent to a single post-exposure baking operation, as evidenced by Petersen and Fuji

Film. Second, we have the fact that Ulrich in view of Tashiro does not state anything to the contrary to challenge this statement. Rather, respectfully stated, we are left just with the Examiner's own hindsight reasoning in reviewing the claimed invention vis-à-vis Ulrich in view of Tashiro that two post-exposure baking operations are "of course" equivalent to a single post-exposure baking operation, with absolutely no evidentiary support whatsoever.

In light of the foregoing discussion, it is difficult at best to conclude that Ulrich in view of Tashiro suggests the claimed invention: one of ordinary skill within the art generally does not consider two post-exposure baking operations as equivalent to a single post-exposure baking operation, and Ulrich in view of Tashiro does not state anything to the contrary. If one detaches oneself from the patent application at issue here to avoid hindsight reasoning, it is therefore difficult to reconcile the Examiner's position that two post-exposure baking operations are equivalent to one post-exposure baking operation. The evidence just does not support this conclusion, and therefore does not support a conclusion of *prima facie* obviousness under 35 USC 103 over Ulrich in view of Tashiro.

Indeed, in light of the foregoing discussion, the patent application is not only not *prima facie* obviousness over Ulrich in view of Tashiro, but is in fact not obvious, period, over Ulrich in view of Tashiro. For example, the inventors novelly invented a process during which a single post-exposure bake operation results in the formation of a depression. While the single post-exposure bake operation "can last for as long as about 5 minutes" (specification, p. 7, para. [0025]), "many of the structural changes and on the onset of cross-linking" which result in formation of the depression "typically occur during the first several seconds of the bake" (id.). That is, "a depression 15 forms in the surface of the photo-resist during a PEB" (i.e., a post-exposure bake), "due to diffusion 16 across the interface 14 from the unexposed portion 11 into the exposed portion 12" (specification, pp. 7-8, para. [0026]).

Therefore, the fact that a *single* post-exposure baking operation can result in a depression being formed is something that the inventors invented. Ulrich in view of Tashiro, by comparison,

came up with the fact that it takes *two* post-exposure baking operations to form a depression. Note that the claimed invention flies in the face of convention, which pursuant to Petersen and Fuji Film is that two post-exposure baking operations provides a different effect than a single post-exposure baking operation does. Rather, the inventors have inventively developed an approach in which a *single* post-exposure baking operation achieves the *same effect* as *two* post-exposure baking operations, which is novel. That is, in the past, one of ordinary skill within the art would not believe that the same effect that two post-exposure baking operations achieves (e.g., depression formation) could instead be achieved by a single post-exposure baking operation. The claimed invention realizes just that, however, and thus represents a patentable advance in the state of the art of semiconductor processing.

For all the above reasons, therefore, Applicant respectfully requests that the Examiner reconsider the rejection of the pending claims, and issue a notice of allowance.

Respectfully Submitted,



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